

## Waterfowl predation in Canada by the Northern Pike (or Jackfish) *Esox lucius* L.

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The pike is a well-known predator of juvenile waterfowl in Europe, and in Canada the same species is so plentiful in those waters which are ideally suited to waterfowl breeding—where the depth is about three feet and the aquatic vegetation abundant—that<sup>1</sup> “It is evident that millions of ducklings (and muskrats) are lost every season to jackfish”. This means that the *annual duckling loss* in the delta regions of northern Canada far exceeds the greatest total of ducks that is ever at any one time in the British Isles. The greatest destruction occurs in the shallows where 2 lbs. to 4 lbs. pike, which are the worst offenders, are most plentiful, though 1 lb. pike, too, readily take ducklings, as also will pike up to 10 lbs. Entire broods are wiped out by the pike. The larger fish (up to 10 lbs.) frequent deeper water and to some extent prey on the diving species. Particularly widespread and wholesale destruction occurs during June and early July shortly after spawning which coincides with duckling hatching time (and the first crop of young muskrats). Pike have often been watched pursuing ducklings and catching them on the surface when trying to escape; they are swallowed tail first. The majority of young waterfowl taken are less than one week old, probably because these spend most time in the shallows where pike abound. Also, small waterfowl cannot move as rapidly, nor for as great a distance when pursued, as the larger ones. The very young of all species tend to dive when pursued while the older ones flee on the surface from a pursuer.

The pike from an early age is dangerous to ducklings and it grows rapidly, at the rate of about 1 lb. per annum. It takes a pike at least three days, or a good deal longer, to digest a duckling (or muskrat), after which it will feed again. A 1 lb. duckling has been found in a 2½ lbs. pike; a 7 lbs. pike contained three ducklings and another two well-grown ducklings; an 8½ lbs. pike had eaten a 10 ozs. Blue-bill; another contained a full grown coot and one died trying to swallow a Horned Grebe. Seven goslings were seen to be taken in succession by large pike. Twelve pike, averaging 3–8 lbs., contained a total of ten ducklings and three muskrats. In a batch of 23 pike examined, 15 contained food and of these four had taken birds—three each a young coot, the other a Lesser Scaup. According to Mr. Dudley R. Foskett of Edmonton, Alberta “In 1958 I took a pike while angling in Pudge Lake, Riding Mountain National Park, which had four ducklings in its stomach”. These are but a few examples of pike predation.

In the Prairie Provinces of Canada in the past 40 years the tremendous increase in the acreage of cereal crops has resulted in a great contraction of the water areas in which the ducks once bred. From 1900 to 1940 there was an elevenfold increase in crop area—from 3½ million to 40 million acres. This reduction of the available nesting area on the prairies has focussed attention on the alarming extent of duckling predation by pike in the important duck breeding grounds in the Saskatchewan and Athabasca delta regions. Observations made 35 years ago indicated the seriousness

of this pike predation. In 1939, 1940 and 1941 a series of investigations, supplemented by the reports of a host of expert observers, were carried out in these deltas during the 60 to 80 days' period in which ducklings are available to pike. Determinations were made of the age, sex, length, weight and stomach contents of the pike; captive pike were examined at intervals after having been fed on chicks, ducklings, young grebes, pieces of muskrat, etc., to determine the rates of digestion of different types of food; and intensive fishing was carried out to obtain data concerning the total pike population. A study was made of waterfowl brood sizes, nesting habits, times of broods reaching the water and susceptibility to destruction by pike.

It has been estimated that for each of the six years 1936-1941 (inclusive) the annual average duck population, of all ages, in the 900,000 water and marsh acreage of the Saskatchewan and Athabasca deltas, amounted to about  $14\frac{1}{2}$  millions. In these regions destruction of young waterfowl by pike probably totalled  $1\frac{1}{2}$  million per annum or 9.7 per cent; but this loss is only about 3.2 per cent of the total duck population of the Prairie Provinces at breeding time. These figures are of staggering proportions.

Predation by pike may destroy one young waterfowl per 0.5 acre—it can be as much as 1.7 per acre—per season. Pike between 19 and 30 inches ( $1\frac{1}{2}$  to 6 lbs.) are responsible for 71.5 per cent of all predation, although during two seasons' (1940-41) investigations, when 3,000 pike were caught, this size range was represented by only 23.3 per cent (620 out of 2,658) of all the pike examined which were large enough (over 14 inches) to prey on waterfowl. As a rule, female pike contained three times the weight of food found in males, although averaging but  $1\frac{1}{4}$  inches longer. Female pike constituted 47.8 per cent of the population, though responsible for 56 per cent of the predation. Diving ducklings are taken three times as often as surface-feeders, probably because of the greater proportion of time spent by divers underwater, and their consequent greater accessibility to pike. The highest estimated duck population, in a lake of eight square miles, was 3,350 per square mile or 5.2 ducks per acre—a figure 50 per cent higher than in any other area investigated. In another area of eight square miles of water and marsh it was estimated there were some 20,000 pike and 18,742 ducks: yet another of two square miles held 10,000 pike and 4,300 ducks. Four sample counts in a water area of 60,800 acres suggested a total duckling loss, from pike predation, of 182,000 or three per acre. The average loss in three areas studied was reckoned to be 34.1 per cent of the hatch, but the total loss in a selected area where the loss was most severe was as high as 57 per cent.

In Northern Alberta several months' study in one area indicated a 40 per cent loss of the total duckling hatch; there is evidence of similar losses in the Athabasca delta in the same Province.

In two lakes of similar extent, the brood count of the one which was badly infested with pike was only 2.7, but in the other which was free from this predator it was 8.9. The best time for making these counts is the eventide.

The abundance of other food of the pike—either animal or plant—appears to have no bearing on the predation of the pike on ducklings.

Often it was not possible to determine the pike population accurately, but it is at least as great, and sometimes many times as great, as the duck population on all the lakes studied.

Depredations can be very variable, for 0.42 per cent of pike examined in one large lake contained ducklings, yet in another 7.5 per cent of those caught had eaten ducklings, and in another the proportion was three per cent.

Pike abundance is well illustrated by a catch of 445 small pike taken in a one hundred yards long  $2\frac{1}{2}$  inch mesh gill-net which was set for eight hours. In a water area of 18 acres the population density of pike capable of preying on young waterfowl was 27 per acre.

Investigations over a period of 26 days showed 68 broods of ducklings totalling 457, an average of 6.7; on another lake in 35 days 80 broods were counted totalling 447, an average of 5.56. Other counts record 43 broods totalling 225—an average of 5.2, and 121 broods averaging 5.8. In pike infested waters the average of 32 broods of dabbling ducks was 5.5, and of 32 broods of diving ducks (Canvas-back and Lesser Scaup) 5.4. While in waters not infested with pike (though it was possible that the broods might have access to infested waters) 24 broods of dabblers averaged 5.9, and nine broods of divers (Canvas-back and Lesser Scaup), 9.0.

Pike not infrequently contain more than one young waterfowl; the most recorded seems to be four.

In an investigation in 1940 in the Athabasca delta, 1,758 pike were examined; 13 or 0.74 per cent contained young ducks, nine or 0.51 per cent young coots, and two or 0.16 per cent young muskrats. Of this predation 77 per cent was by pike of 22 to 27 inches and weighing  $2\frac{1}{4}$  to 4 lbs. Again, of 2,658 pike large enough to prey on young waterfowl, 29 or 1.08 per cent had eaten ducklings, and five or 0.20 per cent young coots and grebes. Of these 34 pike, 29 each contained one young waterfowl, three contained two, one had three and the other four waterfowl. A juvenile Yellow-headed Blackbird, *Xanthocephalus xanthocephalus* (Bonaparte) was found in one pike stomach.

The five species of ducklings taken most frequently, *i.e.* 70 to 75 per cent:— Mallard, *Anas platyrhynchos* L., Lesser Scaup or Bluebill, *Aythya affinis* (Eyton), Canvas-back, *Aythya valisineria* (Wils.), Pintail, *Anas acuta* L., Blue-winged Teal, *Anas discors* L.

Five species taken less frequently, *i.e.* 28 per cent:— Redhead or Pochard, *Aythya americana* (Eyt.), Ruddy Duck, *Erismatura jamaicensis* (Gmel.). American Golden-eye or Whistler, *Bucephala clangula americana* (Bonap.), White-winged Scoter, *Melanitta fusca deglandi* (Bonap.), Shoveler or Spoon-bill, *Anas clypeata* L.

Very few taken, four species:— Baldpate or American Wigeon, *Anas americana* Gmel., Buffle-head or Spirit Duck, *Bucephala albeola* (L.), Gadwall or Grey Duck, *Anas strepera* L., Green-winged Teal, *Anas crecca carolinensis* Gmel.

Rarely taken, three species:— Black Duck, *Anas rubripes* Brewster, Wood Duck, *Aix sponsa* (L.), Ring-necked Duck, *Aythya collaris* (Donov.).

Also taken, three species of Grebe:— Red-necked or Holboell's Grebe, *Colymbus grisegena holbollii* (Reinh.), Horned Grebe, *Colymbus auritus* L., Pied-billed Grebe, Dabchick or Hell Diver, *Podilymbus podiceps podiceps* (L.) and American Coot or Mud-Hen, *Fulica americana americana* Gmel.

According to information received *in litt.* some 20 species of dabbling and diving ducks commonly nest in Alberta and the Northern Pike, *Esox lucius* and Arctic Char, *Salvelinus alpinus malma* (Walbaum) prey occasionally on ducklings. Pike occur sporadically in the warmer waters of the prairies and parklands where most of these ducks nest. The Goldeneyes, *Bucephala* spp., the Mergansers, *Mergus* spp. and the Harlequin Duck, *Histrionicus histrionicus* (L.) breed in the range of the Arctic Char, i.e., the cooler waters of the foot-hills, mountains and north.

The latest information received from Ducks Unlimited (Canada) indicates that "little research work has been done on pike predation on waterfowl in recent years", and though this wastage continues "the overall losses are small in comparison to losses suffered from raccoon and skunks".

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## Notes on the African Lily-trotter *Actophilornis africanus* (Gmelin)

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For several years African Lily-trotters, *Actophilornis africanus* (Gmelin) have frequented an eight-acre dam at Karen, near Nairobi, Kenya, at an altitude of 6,000 ft. The birds were first recorded when blue water-lily (*Nymphaea capensis*) invaded the dam and provided a suitable habitat. Later, when a planted bed of an exotic water-lily spread, this formed the breeding focus for the birds as the pads were generally denser and formed a more secure base for the flimsy nests. Incidentally, the leaves of the yellow lily have a purple-brown under-surface and these with the yellow flowers form a striking similarity of colour to the plumage of the Lily-trotter. Certainly cryptic, and the sitting bird was extremely difficult to spot even with the aid of field glasses.

Several pairs of Lily-trotters have nested during the last few years, but previously we failed to see chicks. This season, June/July, 1961, a pair nested among the yellow lilies and from a permanent floating "hide" many hours of observations were made and the hatching of an egg and the